

# Scale structure, coercion, and the interpretation of measure phrases in Japanese

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## ABSTRACT

This paper investigates the semantics of measure phrases in Japanese. Based on new data, we argue that the interpretation of measure phrases in Japanese is sensitive to scale structure such that (i) the degree morpheme *Meas* (Svenonius and Kennedy 2006) that introduces measure phrases selects only for gradable predicates whose scale contains a minimal element (i.e., a lower closed scale) and (ii) violations to this restriction are repaired via coercion, which forces a comparative interpretation with a contextually determined standard and hence a minimal element.

We compare the Japanese facts to data in other languages and argue that the requirement of having a minimal element is not specific to Japanese, but universal. We show that languages may vary in how they deal with potential violations of this universal constraint, including coercion of a contextually recoverable derived minimal element (Japanese), ungrammaticality (e.g. Spanish, Korean, Russian), and a hybrid system of ungrammaticality for some adjectives and allowed constraint violation for others (e.g., English, German, Italian).

Key words: measure phrase, scale structure, direct measurement, differential measurement, coercion, scale shift, crosslinguistic variation

## 1 Introduction

Measure phrases can be used with gradable predicates in two semantically distinct ways. In ABSOLUTE MEASUREMENT, the measure phrase specifies the degree to which an individual extends relative to some dimension, and in DIFFERENTIAL MEASUREMENT, the measure phrase specifies the difference in degree between two individuals with respect to some dimension. In English, absolute measurement is expressed using the plain (unmarked) form of a

gradable predicate and differential measurement is expressed using a comparative form, as in (1):

- (1) a. John is six feet tall. ABSOLUTE MEASUREMENT  
b. John is six inches taller (than Bill). DIFFERENTIAL MEASUREMENT

Schwarzschild (2005) observes that there is both language-internal and cross-linguistic asymmetry between these two kinds of measurement.<sup>1</sup> First, language-internally, the set of adjectives that permit measure phrases for absolute measurement is idiosyncratic and varies from language to language, whereas any adjective associated with a measurable scale can be used in a comparative construction with a differential measure phrase. For example, in French, *haut* 'high' is grammatical with absolute measurement (2a) but *grand* 'tall' is not (2b), though both are grammatical with differential measure phrases in comparative constructions (2c-d). In English, whereas *tall* is compatible with both absolute and differential measurement (1), *heavy* is unacceptable with absolute measurement but acceptable with differential measurement (3).

- (2) a. **haut** de 1,27 m  
'1.27 m high'  
b. \***grand** de 1.27m  
'1.27 m tall'  
c. plus **haut** que la Tour Eiffel de 1 m  
'1 m higher than the Eiffel Tower'  
d. plus **grand** que Mari de 2cm  
'2 cm taller than Mari'
- (3) a. \*5 lb heavy  
b. 5 lb heavier

Second, cross-linguistically, Schwarzschild (2005) generalizes that if a language allows a measure phrase to combine with a plain adjective, it also

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<sup>1</sup> Schwarzschild (2005) uses the terms 'direct measurement' and 'indirect measurement', respectively, instead of the terminology we employ, 'absolute measurement' and 'differential measurement'. Schwarzschild calls a measure phrase when it combines with a plain adjective a 'direct measure phrase' (*two feet tall*) and calls a measure phrase when it combines with a comparative or *too* phrase an 'indirect measure phrase' (*two feet taller*). In anticipation of the Japanese data below, we define 'absolute measurement' and 'differential measurement' based purely on semantics, not on morpho-syntax.

allows a measure phrase to combine with a comparative, but not vice versa. In other words, in some languages there is a general ban on absolute measurement but not on differential measurement, but there are no languages that allow absolute measure to the exclusion of differential measurement. In Spanish, for example, (4) exemplifies the patterning for all measurable adjectives. Measure phrases are acceptable in comparative constructions only:

- (4) a. \*Juan es dos metros alto.  
 Intended: 'Juan is two meters tall.'  
 b. Juan es dos centímetros más alto que Jorge.  
 'Juan is two centimeters taller than Jorge.'

At first glance, Japanese appears to conform to Schwarzschild's generalization and can be classified as a Spanish-type language, one that permits differential measurement but has a general ban on absolute measurement. Thus measure phrases are acceptable in comparative constructions and give rise to differential measurement (5a), but cannot be used with simple adjectival predicates for absolute measurement (5b).

- (5) a. Kono tana-wa ano tana yori (2-meetoru) takai.  
 This shelf-TOP that shelf than 2-meter tall  
 'This shelf is (2 meters) taller than that shelf.'  
 b. Kono tana -wa (#2-meetoru) takai.  
 This shelf-TOP 2-meter tall  
 Intended: 'This shelf is two meters tall.'

However, there are two interesting puzzles in the interpretation of Japanese measure phrases. First, whereas in Spanish, the direct combination of a measure phrase with an adjective leads to ungrammaticality, as in (4a) above, it is well documented that in Japanese, such a combination is allowed, and gives rise to differential measurement, despite the absence of any overt comparative morphology (Snyder et al. 1995; Kikuchi 2006; Nakanishi 2007; Hayashishita 2009):

- (6) DIFFERENTIAL MEASUREMENT  
 a. Kono tana-wa 2-meetoru takai.  
 This shelf-TOP 2-meter tall  
 'This shelf is 2 meters taller.'  
 NOT: 'This shelf is 2 meters tall.'

- b. Kono roopu-wa 5-inchi nagai.  
This rope-TOP 5-inch long  
'This rope is 5 inches longer.'  
NOT: 'This rope is 5 inches long.'
- c. Kinoo-wa 5-do atataka-katta.  
Yesterday-TOP 5-degree warm-PAST  
'It was 5 degrees warmer yesterday.'  
NOT: 'It was 5 degrees warm yesterday.'

What is puzzling is that there is no overt comparative morphology in the sentences in (6): without the measure phrases, these sentences would not have a comparative interpretation, but would rather have the expected positive semantics. The transparent mapping between the form of the adjective (plain vs. comparative) and the interpretation of the measure phrase (absolute vs. differential) — which holds in all of the data Schwarzschild considers — breaks down here.

The second puzzle is that, contrary to previous claims, Japanese measure phrases do give rise to absolute measurement with a certain class of gradable predicates:

(7) ABSOLUTE MEASUREMENT

- a. Kono sao-wa 5-do magat-teiru.  
This rod-TOP 5-degree bend-PERF  
'This rod is 5 degrees bent.'  
NOT: 'This rod is 5 degrees more bent.'
- b. Kono fusuma-wa 3-senti ai-teiru.  
This sliding door-TOP 3-centimeter open-PERF  
'This door is 3 centimeters open.'  
NOT: 'This door is 3 centimeters more open.'
- c. Pisa-no syatoo-wa 3.97-do katamui-teiru.  
Pisa-GEN leaning tower-TOP 3.97-degree incline-PERF  
'The Leaning Tower of Pisa is 3.97 degrees inclined.'  
NOT: 'The Leaning Tower of Pisa is 3.97 degrees more inclined.'
- d. Kono tokai-wa 2-fun hayai.  
This clock-TOP 2-minute fast  
'This clock is 2 minutes fast.'  
NOT: 'This clock is 2 minutes faster.'

Whereas in (6), the combination of a measure phrase with a gradable predicate results in an obligatory differential interpretation, (7) shows the opposite

patterning: only the absolute interpretation is available. The descriptive generalization is that adjectives that have a lower closed scale (in the sense of Kennedy and McNally 2005) give rise to absolute measurement whereas adjectives that have a lower open scale give rise to differential measurement. We find that the acceptability of absolute measurement with lower closed scale predicates is not specific to Japanese but holds in other languages that otherwise have a general ban on absolute measurement, for example, Spanish, Korean and Russian:<sup>2</sup>

- (8) Esta varilla está **doblada** noventa grados. SPANISH  
 This rod is bent ninety degrees  
 'This rod is ninety degrees bent.'
- (9) i hwoychori-nun i-to (cengto) **hwies-ta.** KOREAN  
 this rod-TOP two-degree about bent-DECL  
 'This rod is (about) two degrees bent.'
- (10) Etot prut **pognut** na p'at' gradusov. RUSSIAN  
 this rod bent by five degrees  
 'This rod is five degrees bent.'

In light of these observations, the purpose of this paper is to address the following two questions:

1. Why is it that in Japanese (and other languages that otherwise have a general ban on absolute measurement), lower closed scale adjectives pattern with comparatives in being acceptable with measure phrases?
2. How and why in Japanese (but not in other languages) does the direct combination of a measure phrase with a non-comparative adjective give rise to differential interpretation?

As for the first question, we argue that lower-closed scale adjectives and comparative constructions constitute a natural class in that both are associated with scales that have a minimal element. With lower-closed scale adjectives, the

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<sup>2</sup> The reader will no doubt notice that in both the Japanese sentences in (7) and the Spanish, Korean and Russian sentences in (8)-(10), the gradable predicates are all deverbal. Although there is a clear correlation among gradable predicates between being measurable and having a lower closed scale on the one hand and being deverbal on the other hand, we will argue below that it is the semantics of the predicate and not its deverbal morphology that is crucial to the interpretation of the measure phrase.

minimal element is built into the scale, and with comparative adjectives, the standard of comparison provides a derived minimal element. We show that this follows naturally from an approach to comparative semantics described in Kennedy and McNally 2005, Svenonius and Kennedy 2006, and Kennedy and Levin 2008, in which the function of comparative morphology is to turn a basic measure function into a derived ‘difference function’ whose minimal element corresponds to the degree associated with the standard of comparison (applied recently to Japanese in Kubota 2009).

To derive the ready combinability of lower-closed scale adjectives and comparatives with measure phrases, we propose a semantic selectional restriction on the Deg head *Meas*, the functional head that mediates the relation between a gradable predicate and a measure phrase (Svenonius and Kennedy 2006), such that it selects only for gradable predicates that are both associated with a salient measurement system and have a minimum element. We furthermore suggest that this semantic selectional restriction is universal, although some languages such as English and French are able to override it for a small lexically idiosyncratic set of predicates.

As for the second question, we argue that in Japanese, when *Meas* combines with an open scale adjective, the conflict between the selectional restriction on *Meas* and the scale associated with the adjective gives rise to semantic coercion: the mismatch forces the adjective to take on a comparative interpretation with a contextually determined standard, thereby providing a minimal element. We call this coercion mechanism ‘scale shift’ (on analogy with ‘aspect shift’; de Swart 1998). We further argue that the reason this coercion strategy is not available in other languages that have a general ban on absolute measurement such as Spanish is because it is blocked (in the sense of Chierchia 1998) by the availability of overt comparative morphology which can provide the same function.

An important implication of this proposal is that the interpretation of measure phrases is sensitive to scale structure and that Schwarzschild’s generalization —that every language that allow absolute measurement also allows differential measurement but not vice versa — can be subsumed under a broader generalization. The apparent opposition between comparative and non-comparative adjectives with respect to measure phrase acceptability is actually an opposition between predicates whose scales have a minimal element and predicates whose scales do not. Crosslinguistically, measure phrases are systematically more acceptable with predicates that provide a minimal element from which the measurement is computed.

The organization of this paper is as follows. Section 2 provides theoretical background on the semantics of gradable adjectives and reviews two previous analyses of the syntax and semantics of measure phrases, found in Schwarzschild

2005 and Svenonius and Kennedy 2006. Sections 3 through 6 focus on Japanese: Section 3 reviews previous approaches to Japanese measure phrases. In Section 4, we investigate the semantics of absolute measurement in Japanese, and in Section 5, we show how the analysis extends naturally to comparatives constructions. In Section 6, we move onto the analyses of differential measurement in Japanese and propose our coercion-based account. Section 7 considers the proposals in cross-linguistic perspective and proposes two parameters of variation in the distribution and interpretation of measure phrases. Finally, Section 8 concludes.

## 2 Theoretical background and Previous analyses of measure phrases

The purpose of this section is to review two previous approaches to the syntax and semantics of measure phrases, namely those found in Schwarzschild 2005 and Svenonius and Kennedy 2006. First we will present Schwarzschild's account and argue that it falls short of capturing the important semantic generalization regarding the interpretation of Japanese measure phrases. Then we will present Svenonius and Kennedy's account and show that although it captures important syntactic facts, it too falls short of capturing the semantic facts. The conclusion will be that a new account is called for which preserves the insights from the previous approaches but also accommodates the new semantic generalization.

Before reviewing the two approaches, a note is in order regarding the semantic type of gradable adjectives and its relevance for the analysis of measure phrases. There are two competing degree-based approaches to the semantic type of gradable adjectives. According to the more standard approach, gradable adjectives denote relations between degrees and individuals (type  $\langle d, et \rangle$ ) (Cresswell 1977; Kennedy and McNally 2005):

$$(11) \llbracket \text{tall} \rrbracket = \lambda d \lambda x. \text{TALL}(x) = d$$

Under another approach, gradable adjectives directly encode measure functions from individuals to degrees (type  $\langle e, d \rangle$ ) (Bartsch and Vennemann 1973; Kennedy 1999; Kennedy 2007a):

$$(12) \llbracket \text{tall} \rrbracket = \lambda x. \text{TALL}(x)$$

A consequence of either approach is that bare predicative adjectives must combine with a (usually null) functional morpheme or type-shifter *pos(itive)* that turns the adjective into a property of individuals. Under the  $\langle e, d \rangle$  approach to gradable adjectives, for example, *pos* looks something like the following:

(13)  $[[pos]] = \lambda g \langle e, d \rangle \lambda x. g(x) \geq \mathbf{stnd}(g)$   
(adapted from Kennedy and Levin 2008)

Here, **stnd** is a function from gradable adjective meanings to degrees that returns a standard of comparison for the adjective: the minimum degree required to “stand out” in the context relative to the kind of measurement expressed by the adjective. For example, (14) shows the derivation for the semantics of *John is tall*:

(14)  $[[John\ is\ tall]] = [[pos]]([[tall]])([[John]])$   
 $= \lambda x. tall(x) \geq \mathbf{stnd}(tall)(John)$   
 $= tall(John) > \mathbf{stnd}(tall)$   
‘John’s height is greater than a contextually determined standard.’

See Kennedy 2007 for a fuller exploration of the semantics of *pos*.

We now turn the discussion to measure phrases. When a gradable adjective combines with a measure phrase, as in (15), its analysis depends partly on what the assumptions are about the semantic type of the adjective.

(15) John is six feet tall.

Under the  $\langle d, et \rangle$  analysis of gradable adjectives, the most straight-forward account is one in which the measure phrase is assumed to be type  $\langle d \rangle$  and directly saturates the degree argument of the predicate, thus yielding a property of individuals. Such an approach is found in, e.g., Cresswell 1976, von Stechow 1984, and Heim 2001. Another option would be to take the measure phrase to be a type  $\langle dt, t \rangle$  quantifier. In other words, it could be the case that a measure phrase quantifies over degrees rather than denoting a degree. As we will review below, Schwarzschild 2005, although working with the  $\langle d, et \rangle$  analysis of gradable adjectives, rejects these approaches.

Under the  $\langle e, d \rangle$  analysis of gradable adjectives, on the other hand, either the measure phrase must be of a more complex type than simply  $\langle d \rangle$ , or there must be extra structure involved to revolve the type mismatch between the type  $\langle e, d \rangle$  predicate and the type  $\langle d \rangle$  measure phrase. As we will review below, Svenonius and Kennedy 2006 argue for the latter approach.

Because our own approach makes crucial use of the machinery employed in Svenonius and Kennedy 2006, we will ultimately adopt the  $\langle e, d \rangle$  analysis of gradable adjectives.



## 2.1 Schwarzschild 2005

On the basis of data from English, Italian, Dutch, German, French, Japanese, Russian and Spanish, Schwarzschild (2005) arrives at two descriptive conclusions regarding the distribution of measure phrases:

1. If a language has direct measure phrases [i.e., measure phrase with plain (unmarked) adjectives], it will have indirect measure phrases [i.e., measure phrases with comparatives), but not vice versa. (English, Italian, Dutch, German, French have both; Japanese<sup>3</sup>, Russian, Spanish have only indirect)
2. Among languages that have direct measure phrases, the specific set of adjectives that allow them is lexically conditioned (English, Italian, Dutch, German, French)

In order to capture the first generalization, the key proposal Schwarzschild makes is that measure phrases are not arguments of gradable adjectives, but rather are predicates of gaps. As a consequence, they readily occur in comparative constructions, because such constructions provide a gap in degree between the target and the standard along some gradable dimension. To be able to occur in non-comparatives, extra machinery is involved, since such constructions do not normally provide a gap, hence the crosslinguistic markedness of measure phrases with non-comparatives.

Adopting the view that gradable adjectives denote relations between individuals and degrees, Schwarzschild gives the following logical form for a basic comparative:

- (16) John is taller than Mary.  
 $\exists h_j \exists h_m \text{ tall}'(j, h_j) \ \& \ \text{tall}'(m, h_m) \ \& \ (h_j > h_m)$

In prose, (16) states that there is some degree  $h_j$  and some degree  $h_m$  such that John is  $h_j$ -tall and Mary is  $h_m$ -tall, and  $h_j$  is greater than  $h_m$ .

In the presence of a differential measure phrase, Schwarzschild proposes the following semantics:

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<sup>3</sup> Schwarzschild claims that Japanese is one of the languages that do not allow measure phrases to combine directly with adjectives. Although Schwarzschild is correct that (relative) gradable adjectives with measure phrases in Japanese do not give rise to absolute measurement, he does not note that such combinations are grammatical with a differential interpretation.

- (17) John is [two inches] taller than Mary.  
 $\exists h_j \exists h_m \text{ tall}'(j, h_j) \ \& \ \text{tall}'(m, h_m) \ \& \ \text{2-inches}([h_j \rightarrow h_m])$

Here,  $[h_j \rightarrow h_m]$  represents the gap between Mary's height and John's height, and the measure phrase is a predicate that gives the size of the gap.

In a non-comparative construction, on the other hand, there is no gap to be measured, but rather only a single point on a scale. Thus sentences like the following are correctly predicted to be ill-formed because measure phrases are predicates of gaps rather than of degrees:

- (18) \*Mary is [50 pounds] heavy.  
 $\exists d [\text{heavy}'(m,d) \ \& \ \underline{\text{50-pounds}'(d)}]$  (underlined portion semantically ill-formed because 50-pounds is not a predicate of degrees)

Of course, measure phrases are not always banned in non-comparative contexts. Schwarzschild proposes three sources for apparent counterexamples to his proposal:

1. The Homonym Rule
2. Covert comparatives
3. Unambiguous interval-predicates

**The Homonym Rule** is a lexically-governed type-shifting rule that takes a relation between individuals and degrees and replaces the degree argument with an interval argument. It is repeated here verbatim:

- (19) Homonym Rule: from degrees to intervals.  
 if A has meaning  $A'$  that relates individuals to degrees then A has a secondary meaning relating individuals to sets of degrees (intervals).  
 The secondary meaning is given by:  $\lambda I. \lambda x. I = \{d: A'(x,d)\}$   
 (Schwarzschild 2005:216)

In English, the homonym rule applies to *tall*, *wide*, *deep*, *thick*, *old*, *long*, and *high*. This is meant to capture the fact that these adjectives can occur with measure phrases in non-comparative constructions to the exclusion of other adjectives. The idea is that when the Homonym Rule applies, the resulting interval argument becomes appropriate for a measure phrase predicate:

- (20) Mary is [5 feet] tall.  
 $\exists I [\text{tall}2'(m,I) \ \& \ \text{5-feet}'(I)]$

**Covert comparatives** are adjectives like *early* and *late* which unlike other adjectives and like comparatives can take a measure phrase in a *by*-phrase:

- (21) a. He was late, by just two minutes.  
b. \*He was tall, by just four feet.  
c. He was taller than me, by just four inches.

Schwarzschild argues that such adjectives have no inherent lower bound (we will question this view below). On Schwarzschild's view, *late*, for example, relates events to times, and assuming time extends backwards without limit, the scale has no lower bound. In this sense, it is like a covert comparative, always requiring some contextually specified standard. For this reason, it can take a measure phrase.

**Unambiguous interval-predicates** are adjectives like *strong* as used in examples like the following, where it makes reference to numerical size:

- (22) The army is 1000 men strong.

The evidence that this use of *strong* is an unambiguous interval-predicate is that in the absence of a measure phrase, it takes on a different sense:

- (23) a. The army is strong. (\* on numerical size reading)  
b. This army is stronger than that one. (\* on numerical size reading)  
c. How strong is their army? (\* on numerical size reading)

Having reviewed Schwarzschild's proposals, let us now reconsider his system in light of the descriptive generalization regarding the interpretation of Japanese measure phrases. Since in Japanese, lower-closed scale adjectives are not comparatives and yet still systematically accept measure phrases, Schwarzschild's proposal provides three possible ways of accounting for them: either they are subject to the Homonym Rule, or they are covert comparatives, or they are unambiguous interval-predicates.

One option that we can immediately reject is to analyze lower-closed-scale adjectives as unambiguous interval-predicates. As the following data show, *bent* can be used in its positive form and in degree questions and comparatives, and it has the same sense as it does when it is used with a measure phrase:

- (24) a. This rod is bent.  
b. This rod is more bent than that one.

c. How bent is this rod?

The same facts hold for Japanese *maga-tteiru* 'bent':

- (25) a. Kono sao-wa magat-teiru.  
This rod-TOP bend-PERF  
'This rod is bent.'
- b. Kono sao-wa ano sao-yori magat-teiru.  
This rod-TOP that rod-than bend-PERF  
'This rod is more bent than that rod.'
- c. Kono sao-wa dore-kurai magat-teiru-no?  
This rod-TOP how-degree bend-PERF-Q  
'How bent is this rod?'

In Schwarzschild's system, all of these uses of *bent* require a degree argument rather than an interval argument. Hence *bent* cannot be an unambiguous interval-predicate.

Another option would be to subsume lower-closed scale adjectives under the Homonym Rule. While this would get the facts right, it would fail to capture the crosslinguistic generalization that lower-closed-scale adjectives are always licit with measure phrases. In Schwarzschild's system, the Homonym Rule is the locus of idiosyncrasy, not systematicity.

Finally, the option worth more careful consideration is that lower-closed-scale adjectives are covert comparatives. At least some do accept measure phrases in *by*-phrases, which Schwarzschild uses as a diagnostic for covert comparatives:

- (26) This rod is bent by five degrees.

What we would like to suggest is that Schwarzschild's 'covert comparatives' are actually just a special subtype of lower closed scale adjectives in which the minimal element is indexical to some other scale.

The evidence for this approach comes from entailment patterns. Observe that in a comparative construction with an open-scale adjective, there is no entailment to the positive form. Thus neither of the following sentences are self-contradictory:

- (27) a. John and Bill are both **short**, but John is **taller** than Bill.  
b. John and Bill are both **tall**, but John is **shorter** than Bill.

On the view of adjectival semantics we adopt here, *tall* and *short* both pick out the same set of points on a scale of ‘height’, from the point that approaches zero height (but does not reach it, because zero height is not defined), and extending indefinitely in the other direction toward infinitely increasing height. The only difference between *tall* and *short* is the ordering of the points: the ordering relations are inverse from each other (Kennedy and McNally 2005). This correctly captures the fact that the comparative relations *taller* and *shorter* do not result in any entailment or presupposition about the absolute height of the individuals being compared (except for the presupposition that they **have** height), and hence the non-contradictory status of the sentences in (27) follows.

Schwarzschild suggests that because time extends backwards indefinitely, an adjective like *late* has no lower bound. But observe crucially that unlike the truly open scale adjectives *tall* and *short*, with the pair *early* and *late*, there is an entailment or presupposition from the comparative form to the positive form. The following two sentences are self-contradictory:

- (28) a. #John and Bill both arrived **early**, but John was **later** than Bill.  
 b. #John and Bill both arrived **late**, but John was **earlier** than Bill.

What this suggests is that unlike truly open-scale adjectives, *early* and *late* pick out **complementary** points: *late* picks out the points starting from ‘on time’ and extending indefinitely into the future, and *early* picks out the points starting from ‘on time’ and extending indefinitely into the past. In both cases, the point ‘on time’ constitutes the minimal element on the scale. What sets these adjectives apart from lower closed scale adjectives such as *bent*, *inclined* and *open* is that their respective minimal elements index a point on some other scale; in the case of *late* and *early*, it indexes the contextually specified point corresponding to ‘on time’.<sup>4</sup>

The important point is that if this view is correct, it is expected that Schwarzschild’s ‘covert comparatives’ pattern with lower-closed scale adjectives in systematically accepting measure phrases: ‘covert comparatives’ are just a special subtype of lower-closed-scale adjectives.

In light of these difficulties with accommodating our generalization under Schwarzschild’s system, a new explanatory mechanism is called for. First, however, we turn to a review of Svenonius and Kennedy 2006.

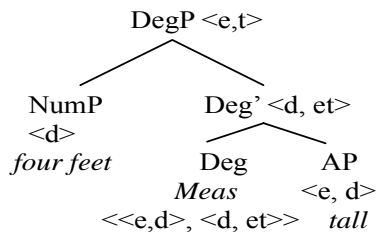
## 2.2 Svenonius and Kennedy 2006

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<sup>4</sup> We thank Chris Kennedy for helpful discussion of this point. See also Kennedy 2001 for additional relevant data and discussion.

Svenonius and Kennedy 2006 adopt the view that gradable adjectives directly encode measure functions, i.e., functions from individuals to degrees (Bartsch and Vennemann 1972, 1973; Kennedy 1999; Kennedy 2007a). They also take measure phrases to denote degrees. Consequently, a type mismatch would occur if a (type <d>) measure phrase combined directly with a (type <ed>) gradable adjective. The authors therefore propose that measure phrases are introduced by a special degree morpheme *Meas* with the following syntax and semantics:

(29)



(30)  $[[Meas]] = \lambda g_{\langle e,d \rangle} : g$  is a function from objects to measurable degrees  
 $\lambda d \lambda x. g(x) \geq d$

Although our focus here is on measure phrases, we note in passing that this approach fits in with a more general picture of the syntax and semantics of the adjectival projection that extends to the positive form, comparatives, and other degree constructions as well; see Kennedy 1999 for the details, and see Corver 1997 for discussion of the functional head analysis of the adjectival projection.

As seen here, *Meas* is a null functional head that selects for an appropriate gradable adjective as its complement and a measure phrase as its specifier. Semantically, the function of *Meas* is to prepare the measure-function-denoting adjective to combine with a degree-denoting measure phrase so that the result will be a property of individuals.

This view of measure phrases has two important advantages. First, it is able to account for lexical idiosyncrasy in which adjectives can combine directly with measure phrases by encoding it as arbitrary selectional restrictions on *Meas*. Since the lexicon (and in particular, lexical selectional restrictions) are standardly thought to be a primary locus of idiosyncrasy in natural language, it seems a natural place to encode idiosyncrasy in the distribution of measure phrases.

Second, by assuming that measure phrases are associated with a unique functional head, we have a handle on accounting for syntactic phenomena that are sensitive to the presence of a measure phrase. The phenomenon that Svenonius and Kennedy focus on is a degree question construction in Northern

Norwegian which is surface-string-identical to a yes/no-question but which is grammatical only for adjectives associated with a measurable scale:

- (31) a. Er du gammel?  
are you old  
'Are you old?' OR 'How old are you?'
- b. Er ho flink?  
is she talented  
'Is she talented?' (NOT: 'How talented is she?')

The authors capture this asymmetry by proposing that there is a null degree operator which can be introduced only by *Meas*:

- (32) [Op1 Er du[DegP t1 *Meas* gammel]]  
'What is the maximal degree *d* such that you are *d*-old?'

Another construction sensitive to the presence of a measure phrase, discussed in Grano and Kennedy 2009, is Mandarin transitive comparatives. This is a special comparative construction in Mandarin that is grammatical only in the presence of a differential measure phrase:

- (33) zhangsan gao lisi \*(yi-cun / yi-xie).  
Zhangsan tall Lisi one-inch / a-little  
'Zhangsan is (one inch / a little) taller than Lisi.'

It is also incompatible with adjectives that are not associated with a measurable scale:

- (34) \*zhangsan gaoping lisi (yi-xie).  
Zhangsan happy Lisi a-little

Grano and Kennedy capture these facts by proposing that the standard of comparison needs to be assigned abstract Case, and in transitive comparatives, *Meas* is the only available case assigner, and hence the obligatory status of the measure phrase follows. In Schwarzschild's system, in which measure phrases are adjuncts, it is not clear how one would account for their syntactic sensitivity in Mandarin transitive comparatives.

In sum, although Svenonius and Kennedy's analysis is well suited to capturing lexical idiosyncrasy in the distribution of measure phrases and the syntactic sensitivity of measure phrases in certain constructions, it does not

capture either Schwarzschild’s generalization or the generalization regarding Japanese: it does not follow from anything in the proposal that comparative or lower-closed-scale adjectives should pattern to the exclusion of other adjectival constructions in systematically allowing measure phrases.

With these remarks in place, we now turn to our analysis of Japanese measure phrases which retains both the semantic insights of Schwarzschild’s account and the syntactic insights of Svenonius and Kennedy’s account, while at the same time capturing the Japanese facts in a principled way.

### 3 Previous analyses of Japanese measure phrases

Let us now move onto the main part of this paper, the analysis of Japanese measure phrases. Before proposing our analysis, we first review previous analyses of Japanese measure phrases. As we stated in the Introduction, in previous literature it is claimed that when a measure phrase combines directly with an adjective in Japanese, it has only a differential interpretation, with a contextually determined standard (Snyder et al. 1995; Schwarzschild 2005; Kikuchi 2006; Nakanishi 2007; Hayashishita 2009):

- (35) a. Kono tana-wa 2-meetoru takai.  
 This shelf-TOP 2-meter tall  
 ‘This shelf is 2 meters taller.’  
 NOT: ‘This shelf is 2 meters tall.’
- b. Kono roopu-wa 5-inchi nagai.  
 This rope-TOP 5-inch long  
 ‘This rope is 5 inches longer.’  
 NOT: ‘This rope is 5 inches long.’
- c. Kinoo-wa 5-do atataka-katta.  
 Yesterday-TOP 5-degree warm-PAST  
 ‘It was 5 degrees warmer yesterday.’  
 NOT: ‘It was 5 degrees warm yesterday.’

To explain the obligatory differential reading for sentences like (34), Snyder et al. (1994) following similar proposals in Fukui 1986, claim that AdjP in Japanese lacks the specifier position that hosts a degree variable:

- (36) a. English                      b. Japanese  
 [AdjP \_ [Adj’ A]]                      [AdjP A]  
 (The scheme, from Hayashishita 2009: 96)



In this system, measure phrases in Japanese can combine with gradable adjectives only through the mediation of covert morphology that gives rise to a differential interpretation.

In a different vein, Kikuchi (2006) attempts to derive the facts from the proposal that degree constructions give rise to a default comparative meaning in languages that do not have an overt morphological contrast between positive- and comparative-form adjectives. Since Japanese lacks an overt comparative morpheme like English *-er/more*, the default comparative value is chosen when a measure phrase is present.

An empirical shortcoming of both approaches is that neither consider examples like those in (2) above which show that Japanese does allow absolute measurement in certain environments. The examples are repeated here:

- (37) a. Kono sao-wa 5-do magat-teiru.  
This rod-TOP 5-degree bend-PERF  
'This rod is 5 degrees bent.'  
NOT: 'This rod is 5 degrees more bent.'
- b. Kono fusuma-wa 3-senti ai-teiru.  
This sliding door-TOP 3-centimeter open-PERF  
'This door is 3 centimeters open.'  
NOT: 'This door is 3 centimeters more open.'
- c. Pisa-no syatoo-wa 3.97-do katamui-teiru.  
Pisa-GEN leaning tower-TOP 3.97-degree incline-PERF  
'The Leaning Tower of Pisa is 3.97 degrees inclined.'  
NOT: 'The Leaning Tower of Pisa is 3.97 degrees more inclined.'

These examples are interpreted with absolute measurement.

Thus we need a new theory that can account for the asymmetry between (35) and (37). One might object that the sentences in (37) are not a problem for current theories of Japanese measure phrases because the predicates that give rise to absolute measurement reading are deverbal, and hence outside the empirical scope of these previous treatments (see also footnote 2 above). However, three pieces of evidence support the view that the predicates that give rise to absolute measurement in Japanese, although mostly deverbal, nonetheless have the same basic semantic type as gradable adjectives.

First, the [verb + *teiru*] predicates in (37) have a stative meaning similar to gradable adjectives. As Kindaichi (1950, 1976) argues, the *teiru* construction is known to receive three distinct interpretations: an on-going process interpretation analogous to the English progressive, a perfective(/resultative)

interpretation, and a stative interpretation (See also Fujii 1966; Jacobsen 1992; Teramura 1984; Ogihara 1998, among many others):

- (38) a. Taro-wa ima ie-o tate-teiru. (progressive)  
 Taro-Top now house-Acc build-TEIRU  
 'Taro is now building a house.'
- b. Ki-ga taore-teiru. (perfective/resultative)  
 tree-NOM fall -TEIRU  
 'A tree is down (as a result of having fallen.)'
- c. Kono michi-wa magat-teiru. (stative)  
 This road-TOP bend-TEIRU  
 'This road is curved.' (Kindaichi 1976: 45)

In (38a), *-teiru* is interpreted as a progressive marker, in (38b) it is interpreted as a resultative marker, and in (38c) it is interpreted as a stative marker. As Kindaichi (1976: 45) argues, *maga-teiru* in (38c) denotes a state, as evidenced by the fact that it does not presuppose or entail a starting point or an endpoint. In this sense, the [verb+*teiru*] predicate in (38c) is semantically like an adjective. The intuition that predicates like *maga-teiru* 'bent' are not associated with a starting point or endpoint is supported by the felicity of the following dialogue:

- (39) A: Kono sao-wa magat-tei-masu.<sup>5</sup>  
 This rod-TOP bend-PERF-PERFORMATIVE.POL  
 'This rod is bent.'
- B: Naze mage-ta-no?  
 Why bend-PAST-Q  
 'Why did you bend it?'
- A: Iya. Saisho-kara konna katachi-desu.  
 No beginning-from this kind of shape -PRED.POL  
 'It is like this from the outset.'

The fact that speaker A can successfully deny speaker B's question shows that the meaning of *maga-teiru* in (38c) is not inherently resultative. The same result holds for the other predicates in (37) if similar tests are applied. These predicates do not entail or presuppose that there was an event before the current state (although it pragmatically allows the possibility, Jacobsen 1992:164).

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<sup>5</sup> We use the performative honorific form *masu* here in order to approximate a natural discourse, but this does not affect our point; it does not contribute to the propositional meaning of the utterance.

The second piece of evidence for the idea that [verb + *teiru*] in absolute measurement is semantically adjectival has to do with modification structure. As the following example shows, the intensifier *totemo* can modify [verb + *teiru*]:

- (40) a. Kono michi-wa **totemo** magat-teiru.  
 This road-TOP very bend-PERF  
 'This road is very curved.'  
 b. \* Kono michi-wa **totemo** magaru.  
 This road-TOP very bend  
 'lit. This road curves well.'

*Totemo* can modify a verb only if the verb has a STATE component and a gradable property (cf. Tsujimura 2001).<sup>6</sup> Here we can say that (40a) is natural because the resultative *-teiru* converts the non-stative meaning to be stative (i.e., adjectival).<sup>7</sup>

The final piece of evidence is more direct. There are examples of absolute measurement that use non-deverbal adjectives. As the following example shows, *hayai* 'fast' gives rise to absolute measurement<sup>8</sup>:

- (41) Kono tokai-wa 2-fun hayai.  
 This clock-TOP 2-minute fast  
 'This clock is 2 minutes fast.'  
 NOT: 'This clock is 2 minutes faster.'

(41) is interpreted with absolute measurement in the sense that it does not compare the accuracy of one clock to the accuracy of another clock; rather, it measures the accuracy of just one clock.

Based on the above evidence, we conclude that the predicates that give rise to absolute measurement in Japanese are of the same basic semantic type as those

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<sup>6</sup> Tsujimura (2000: 44) argues that the gradable property needs to be associated with a nontrivial standard (contextual standard). However, this generalization does not hold for (40). *Magat-teiru* in (40) is interpreted as a lower closed scale adjective. This suggests that *totemo* can combine with both lower-closed scale and open scale adjectives.

<sup>7</sup> In Ogihara (1998), *-te iru* is analyzed into two morphemes *-re* and *iru*, each of which makes independent semantic contribution.

<sup>8</sup> In section 2.1 we argued that the Schwarzschild's 'covert comparatives' (e.g., *early/late*) are actually a subtype of lower closed-scale adjectives. The same analysis can be made for Japanese *hayai* 'fast'/'early'.

that give rise to differential measurement, in spite of the fact that some of them are syntactically deverbal. Hence we conclude that what gives rise to the interpretational asymmetry is not the morphosyntax of the predicate but rather the scale structure of the predicate.

#### 4 The semantics of absolute measurement: sensitivity to scale structure

The purpose of this section is to account for why only the sentences in (43) and not those in (42) give rise to the expected 'absolute measurement' interpretation.

- (42) a. Kono tana-wa 2-meetoru takai.  
 This shelf-TOP 2-meter tall  
 'This shelf is 2 meters taller.'  
 NOT: 'This shelf is 2 meters tall.'
- b. Kono roopu-wa 5-inchi nagai.  
 This rope-TOP 5-inch long  
 'This rope is 5 inches longer.'  
 NOT: 'This rope is 5 inches long.'
- c. Kinoo-wa 5-do atataka-katta.  
 Yesterday-TOP 5-degree warm-PAST  
 'It was 5 degrees warmer yesterday.'  
 NOT: 'It was 5 degrees warm yesterday.'
- (43) a. Kono sao-wa 5-do magat-teiru.  
 This rod-TOP 5-degree bend-PERF  
 'This rod is 5 degrees bent.'  
 NOT: 'This rod is 5 degrees more bent.'
- b. Kono fusuma-wa 3-senti ai-teiru.  
 This sliding door-TOP 3-centimeter open-PERF  
 'This door is 3 centimeters open.'  
 NOT: 'This door is 3 centimeters more open.'
- c. Pisa-no syatoo-wa 3.97-do katamui-teiru.  
 Pisa-GEN leaning tower-TOP 3.97-degree incline-PERF  
 'The Leaning Tower of Pisa is 3.97 degrees inclined.'  
 NOT: 'The Leaning Tower of Pisa is 3.97 degrees more inclined.'

The descriptive generalization is that the adjectives in (42) are open scale adjectives whereas the adjectives in (43) are lower closed scale adjectives. Adopting the syntax for measure phrases proposed in Svenonius and Kennedy 2006, we can capture the fact that only lower closed scale adjectives give rise to

absolute measurement in Japanese by imposing an additional semantic selectional restriction on *Meas* which ensures that it can only combine with adjectives that have a minimum element:

- (44)  $[[Meas]] = \lambda g_{\langle e,d \rangle}$ :  $g$  is a function from objects to measurable degrees and  $g$  **has a minimum element**  $\lambda d \lambda x. g(x) \geq d$

Here we can interpret having a “minimum element” as being a lower-closed scale. Among various kinds of scale structures, lower-closed scale (or minimum standard) adjectives “simply require their arguments to possess some minimal degree of the property they describe” (Kennedy 2007:21).

Kennedy and McNally (2005) and Kennedy (2007a) hypothesize the following four scale structures:

- (45) A typology of scale structures:
- |                           |         |
|---------------------------|---------|
| a. (TOTALLY) OPEN SCALE   | ○-----○ |
| b. LOWER CLOSED SCALE     | ●-----○ |
| c. UPPER CLOSED SCALE     | ○-----● |
| d. (TOTALLY) CLOSED SCALE | ●-----● |

Totally open scales lack both minimal and maximal elements. Lower closed scales include a minimum but no maximum. Upper closed scales include a maximum but no minimum, and totally closed scale includes both a minimum and a maximum (see also Paradis 2001 and Rotstein & Winter 2004). One empirical test for the property of having a lower closed scale (with or without an upper closed scale as well) is that lower-closed scale adjectives are generally felicitous with *partially* whereas lower-open scale adjectives are not (Rotstein and Winter 2004):

- (46) a. ??John is partially tall.  
 b. ??The rope is partially long.  
 c. ??The weather is partially warm.
- (47) a. The rod is partially bent.  
 b. The door is partially open.  
 c. The tower is partially inclined.

In Japanese (and English), lower closed scale adjectives are also discernible based on entailment patterns: the negation of a lower-closed scale adjective entails its antonym (48) whereas the negation of a relative gradable adjective does not (49):

(48) (Entailment patterns of a lower-closed scale adjective)

- a. Konosao-wa magat-tei-**nai**. => b. Kono sao-wa masugu-da.  
This rod-TOP bend-PERF-NEG This rod-TOP straight-PRED  
'This rod is not bent' 'This rod is straight.'

(49) (Entailment patterns of a relative gradable adjective)

- a. Taro-wa se-ga takaku-**nai**. ≠> b. Taro-wa se-ga hikui.  
Taro-TOP height-NOM tall-NEG Taro-TOP height-NOM short  
'Taro is not tall.' 'Taro is short.'

Because Japanese *magat-teiru* 'bent' is a lower-closed scale adjective, it has a minimum element and hence is compatible with *Meas*, thus correctly predicting the meaning in (50).

- (50) Kono sao-wa 5-do magat-teiru.  
This rod-TOP 5-degree bend-PERF  
'This rod is 5 degrees bent.'  
NOT: 'This rod is 5 degrees more bent.'

Japanese *takai* 'tall', on the other hand, has no minimum element and thus does not express absolute measurement when combined with a measure phrase:

- (51) Kono tana-wa 2-meetoru takai. (Japanese)  
This shelf-TOP 2-meter tall  
'This shelf is 2 meters taller.'

To summarize, this section argued that in Japanese, absolute measurement is possible only when an adjective has a minimum element. We formalized this generalization by imposing a semantic selectional restriction on *Meas*, the functional head proposed in Svenoniu and Kennedy 2006 that mediates the relation between a gradable adjective and a measure phrase.

## 5 Semantics of comparatives with measure phrases

The analysis of the semantics of absolute measurement in Japanese can naturally extend to the semantics of comparatives with measure phrases. In a regular Japanese comparative construction, the standard of comparison is introduced by *yor*, and a measure phrase measures the gap between the subject and the standard of comparison:

- (52) a. Kono tana-wa ano tana-yori 2-meetoru takai.  
 This shelf-TOP that shelf-than 2-meter tall  
 ‘This shelf is 2 meters taller than that shelf.’  
 b. Kono sao-wa ano sao-yori 5-do magat-teiru.  
 This rod-TOP that rod-than 5-degree bend-PERF  
 ‘This rod is 5 degrees more bent than that rod.’

The crucial point is that in the explicit comparative environment, the interpretational contrast between the two classes of gradable predicates does not arise. Although (52a) contains an open scale adjective and (52b) contains a lower closed scale adjective, there is no semantic difference between the two sentences in terms of the kind of measurement expressed.

Following Kennedy and Levin 2008, we adopt the idea that the function of comparative morphology is to turn a basic measure function into a difference function with a scale whose minimal element –the “derived zero”- corresponds to the degree introduced by the comparative standard (cf. also Kennedy and McNally 2005). Thus we posit the following denotation for *yor*:<sup>9</sup>

$$(53) [[\text{yor}]] = \lambda x \lambda g_{\langle e, d \rangle} \lambda y. g_{g(x)}^{\uparrow}(y)$$

Here, *yor* takes an entity  $x$  and a gradable adjective  $g$  as arguments and returns a function  $\lambda y. g_{g(x)}^{\uparrow}(y)$  which maps entities to a derived scale  $g_{g(x)}^{\uparrow}$ . The starting point of the derived scale corresponds to the degree introduced by the comparative standard  $x$ . A consequence of this analysis is that like morphologically bare adjectives, comparative adjectives are also of type  $\langle e, d \rangle$ , and so they need to combine with *pos* (54) in order to become properties of individuals (Kennedy and Levin 2008). Thus the structure of (55) can be represented as (56):

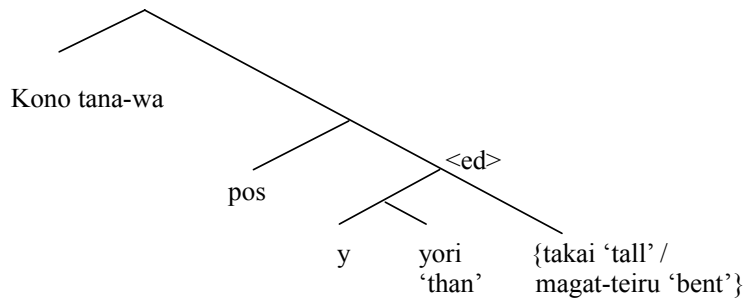
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<sup>9</sup> The application of the ‘difference function’ approach to comparatives in combination with measure phrases is found in Svenonius and Kennedy 2006. We also acknowledge Kubota 2009 for suggesting the application of this semantics of comparatives to Japanese in particular. The proposal that the semantics of comparison is in the standard marker *yor* in Japanese (as opposed to in a null degree morpheme) is not a standard approach. See section 6 below for discussion. See also Kennedy 2007b for the proposal that universally, the semantics of comparatives is in the standard morphology.

(54)  $[[pos]] = \lambda g \langle e, d \rangle \lambda x. g(x) \geq \text{stnd}(g)$   
 (adopted from Kennedy and Levin 2008)

(55) Kono tana-wa [ano tana-yori takai].  
 This shelf-TOP that shelf-than tall  
 ‘This shelf is 2 meters taller than that shelf.’

(56)



Earlier, we showed that in order to calculate the meaning of a sentence with a positive-form adjective such as *John is tall*, *pos* must combine with the adjective in order to relate a degree argument to a contextual standard. However, notice that the standard in (55) is not a contextually determined standard. The standard is *ano tana* ‘that shelf’.

We can explain how the choice of standards is properly regulated even given a single denotation for *pos* by appealing to Kennedy’s (2007) principle of Interpretative Economy. Kennedy claims that the choice of standard is governed by the following principle:

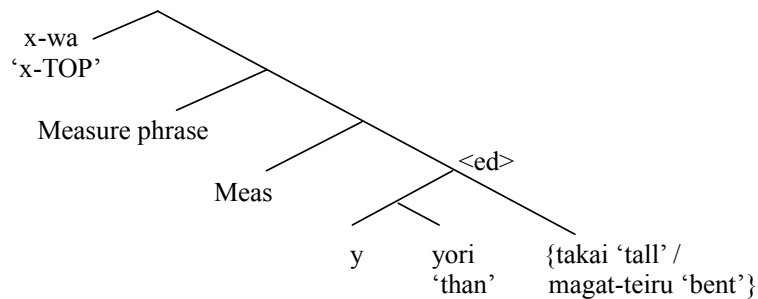
(57) *Interpretive Economy*: Maximize the contribution of the conventional meanings of the elements of a sentence to the computation of its truth conditions. (Kennedy 2007:36)

This economy principle requires that if a given adjective has a minimal element (whether built-in, in the case of lower closed scale adjectives, or derived, in the case of comparative difference functions), *pos* should choose this minimal element as its standard rather than introducing a contextual standard, since in so doing it maximizes the contribution of conventional meaning.

Another important consequence of this approach is that since a standard of comparison provides a minimal element, comparative constructions with a measure phrase are straight-forwardly compatible with *Meas* regardless of the scale structure of the adjective itself, as in (58).



(58)



Note: The canonical position of the measure phrase in this construction is between *yori* and the adjective. We assume that at LF, the measure phrase combines with the constituent [y yori A] (Kubota 2009).

(59) shows the scale structure of *takai* 'tall' and *magat-teiru* 'bent' graphically. Although 'tall' lacks a minimal element and 'bent' has one, as indicated by o and • respectively, the crucial insight is that both take on a derived minimal element when a standard of comparison is introduced:

(59)



What is crucial here is the insight that lower-closed scale adjectives and comparative constructions constitute a natural class in that both are associated with scales that have a minimum element. With lower-closed scale adjectives, this minimum element is built-in, and with comparative adjectives, the standard of comparison provides a minimum element. This follows naturally from the approach to comparative semantics employed here, in which comparative morphology turns a basic measure function into a derived 'difference function' whose minimal element corresponds to the degree associated with the standard of comparison. This explains why lower-closed scale adjectives pattern with comparatives in accepting measure phrases languages that otherwise have a general ban on absolute measurement.

## 6 Differential measurement in Japanese: a coercion-based approach

Now let us consider the semantics of differential measurement in Japanese. Above we argued for the following restriction in the predicates that combine with *Meas*:

- (60) In Japanese, the direct composition of a measure phrase with a gradable predicate is felicitous only when the scale associated with the gradable predicate has a minimum element.

How can we derive the meaning of the following sentences, which seems to violate the constraint in (60)?

- (61) a. Kono tana-wa 2-meetoru takai.  
This shelf-TOP 2-meter tall  
'This shelf is 2 meters taller.'  
NOT: 'This shelf is 2 meters tall.'
- b. Kono roopu-wa 5-inchi nagai.  
This rope-TOP 5-inch long  
'This rope is 5 inches longer.'  
NOT: 'This rope is 5 inches long.'
- c. Kinoo-wa 5-do atataka-katta.  
Yesterday-TOP 5-degree warm-PAST  
'It was 5 degrees warmer yesterday.'  
NOT: 'It was 5 degrees warm yesterday.'

We argue that when a measure phrase combines with an adjective that does not have a minimum element, the scale structure shifts into a structure that has a contextually recoverable minimum element via coercion. Coercion is the general terms for contextual reinterpretation (de Swart 1998).<sup>10</sup> Typically, "coercion is triggered if there is a conflict between the aspectual character of the eventuality description and the aspectual constraints of some other element in the context" (de Swart 1998: 360).

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<sup>10</sup> Note that the definition of 'coercion' is not consistent. For example, Pustejovsky (1993) defines coercion as follows: "a semantic operation that converts an argument to the type which is expected by a function, where it would otherwise result in a type error." (Pustejovsky 1993: 111). Whereas, in de Swart's (1998) definition of coercion, it is triggered by the need to resolve aspectual conflicts and it is not necessarily be triggered by a type mismatch. In this paper, we will use the term coercion in the sense of de Swart (1998).

Let us briefly consider de Swart's analysis of coercion based on the example of English duration adverbials. The verb phrase *play the sonata* in (62a) denotes an event which involves an inherent culmination point. Thus, it can co-occur with *in*-adverbials, as shown in (62b):

- (62) a. John played the sonata.  
 b. John played the sonata in three hours. (event)

On the other hand, the verb phrase *live in Paris* in (63a) denotes a state. States are different from events in that they correspond to eventualities which do not have an inherent endpoint. Thus states (and processes) combine with *for*-adverbials rather than *in*-adverbials:

- (63) a. Susan lived in Paris. (state)  
 b. Susan lived in Paris for three years.

The interesting point is that if we imagine John playing the sonata over and over again, we can use *for* adverbials for the predicate *play the sonata*:

- (64) John played the sonata for three hours. (state; by coercion)

According to de Swart (1998), there is a coercion from event to state in (65) by the implicit operator  $C_{eh}$ :

- (65) [PAST [FOR three hours [ $C_{eh}$  [John play the sonata]]]]

The coercion operator  $C_{eh}$  maps the event of playing the sonata onto a homogeneous eventuality description. In this system, the coercion operator is introduced only when there is a trigger (e.g., a *for* adverbial). Furthermore, the coercion operator is different from a grammatical operator in that coercion is syntactically and morphologically invisible: it is governed by implicit contextual reinterpretation mechanisms triggered by the need to resolve aspectual conflicts (de Swart 1998: 360).

We propose that de Swart's analysis of aspectual shift and coercion can naturally extend to the case of Japanese differential measurement. We can say that in order to avoid the violation of the constraint in (66), adjectives that do not have a minimum element are coerced into adjectives that have a contextually recoverable derived minimum element:

- (66) Kono tana-wa 2-senchi takai. (Japanese)  
 This shelf-TOP 2-cm tall  
 ‘This shelf is 2 centimeters taller.’

The following figure graphically shows the scale shift in (66):

- (67) Scale shift of MP plus *takai*  
 a. *takai*<sub>1</sub> ‘tall’:  
 o-----→  
 b. *takai*<sub>2</sub> ‘taller’ (via coercion)  
 o-----[●-----→]  
 ↑  
 derived minimal element

Let’s call this scale shift a ‘contextual scale shift’. We argue that there is the following implicit coercion operator for the ‘contextual scale’ shift ( $C_s$ ):

- (68)  $[[C_s]]([[ADJ]]) = \lambda g. \lambda x. g_{g(s)}^{\uparrow}(x)$   
 (where  $s$  stands for contextually determined object.)

$C_s$  in (68) coerces the meaning of adjective to have a contextually determined implicit standard from which a measurement is computable. The following Figure shows the full derivation of the interpretation of (66):<sup>11</sup>

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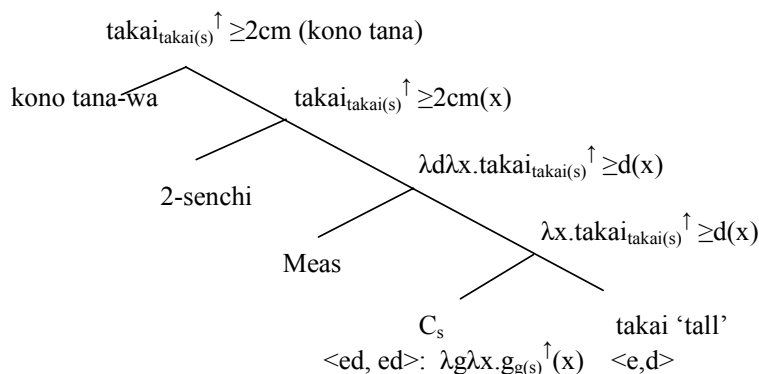
<sup>11</sup> It is also worth noting that ‘contextual scale shift’ arises in other contexts aside from measure phrases. For example, when the minimal degree modifier *sukosi* ‘little’ combines with an adjective that has no minimum element, the adjective meaning is coerced into a meaning that has a contextual determined standard:

- (i) Kono resutoran-wa **sukosi** takai.  
 This restaurant-TOP a bit expensive  
 ‘This restaurant is a bit expensive.’

(i) means that the expensiveness of this restaurant exceeds a contextually determined standard by a small amount. The important point is that the expensiveness of this restaurant is not measured from an absolute zero point, as is the case when *sukosi* combines with a lower closed scale predicate such as *bent*:

- (ii) Kono sao-wa **sukosi** maga-tteiru.  
 This rod-TOP a bit bent-PERF  
 ‘This rod is a bit bent.’

(69)



Notice that an **upper**-closed scale adjective cannot combine with a measure phrase (cf. Kubota 2009):<sup>12</sup>

(70) ?? Kono fusuma-wa 3-senti simat-teiru.  
 This sliding door-TOP 3-centimeter close-PERF

\*‘This door is 3 centimeters closed.’

??‘This door is 3 centimeters more closed than a contextually determined standard.’

The adjective *simat-teiru* has an upper closed scale as evidenced by its felicity with *kanzen-ni* ‘completely’ (e.g., *kono fusuma-wa kanzen-ni simat-teiru* ‘this door is completely closed’). Since upper-closed scale adjectives have an absolute point and cannot be a starting point in an upward directed scale, the resulting interpretation is infelicitous. The question is why (70) cannot be interpreted as differential measurement via coercion. We would like to tentatively consider that

Whereas (ii) means that the rod is close to the zero point on the scale associated with ‘bent’, (i) means the restaurant is close to a contextually determined standard of excessiveness on the ‘expensive’ scale. This shows that the contextual scale shift mechanism is independently motivated. We can find the same phenomenon in English and Dutch. See Bolinger (1972), Ernst (1984), and Klein (1998) for the discussion on the use of minimizers such as *a bit* and *a little*.

Notice however, that there is still an important difference between [measure phrase + *takai*] and [*sukoshi* + *takai*]. While the latter posts a contextually determined norm (vague), the former posits a contextually determined object.

<sup>12</sup> Note that if we add an additive particle *moo* ‘additionally/more’ (e.g. *moo 2-meetoru*), the sentence can be interpreted as having a differential interpretation.

coercion cannot apply to the upper-closed adjective because the adjective has a salient endpoint. The upper endpoint seems to block the coercion strategy.

One might wonder why *yor*i cannot be used instead of the coercion operator Cs. Under our analysis, the meanings of OP and *yor*i are essentially the same. They both provide a standard of comparison. We argue that this is due to a general syntactic constraint on adpositions in Japanese. In Japanese adpositions must combine with an overt complement.<sup>13</sup> Thus, *yor*i cannot be used in sentences like (66) where there is no overt standard.

One might also think that it is a null comparative MORE, rather than a null coercion operator that provides a comparative-like interpretation, thus the coercion is not necessary. In this paper, we assume that *yor*i provides a comparative meaning but current literature on Japanese comparatives often assume that there is a null comparative morpheme ER (e.g., Beck et al. 2004). This view leads us to think that similarly to the case of English (Tom is 2cm taller), there is a comparative morpheme MORE which provides a ‘contextually determined standard’ from which measurement is computed.

However, the null comparative approach is problematic for the following two reasons. First, it cannot explain the asymmetry between (71a) and (71b).

- (71) a. Kono tana-wa 2-meetoru takai.  
This shelf-TOP 2-meter tall  
‘This shelf is 2 meters taller.’  
b. Kono tana-wa takai.  
This shelf-TOP tall  
‘This shelf is tall.’ (NOT: this shelf is taller.)

If the measure phrase is deleted in (71), the resulting sentence is not interpreted as a comparative. (71b) cannot be interpreted as ‘this shelf is taller than a contextually determined object’.<sup>14</sup>

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<sup>13</sup> For example, if the complement of the postposition *ni* ‘to’ is elided, the resulting sentence becomes ungrammatical:

(i) Taro-mo [\_\_ (\*ni)] i-tta.  
Taro-also \_\_ to go-PAST  
‘Taro also went to a contextually determined place.’

<sup>14</sup> Oda (2008) and Beck (2008) develop the idea that Japanese adjectives are inherently comparative and context dependent. According to their analysis, the semantics for *takai* ‘tall’ is represented in (i):

Second, the null comparative morpheme approach cannot naturally explain the difference between absolute and differential measurement:

- (72) a. Kono tana-wa 2-meetoru takai.  
 This shelf-TOP 2-meter tall  
 ‘This shelf is 2 meters taller.’  
 b. Kono sao-wa 5-do magat-teiru.  
 This rod-TOP 5-degree bend-PERF  
 ‘This rod is 5 degrees bent.’  
 NOT: ‘This rod is 5 degrees more bent.’

The null comparative morpheme approach cannot explain why comparative-like interpretation arises only when phrases are combined with an adjective that has no minimum element.

Our coercion approach can naturally explain the contrast in (71) and (72). The comparative-like interpretation in (72a) is the outcome of a repair strategy.

## 7 Typological speculations

In the preceding sections, we argued that (a) the interpretation of measure phrases in Japanese is sensitive to scale structure such that (b) the functional head that introduces measure phrases selects only for gradable predicates that have a minimum element and (c) violations to this restriction are repaired via coercion, which forces a comparative interpretation with a contextually determined standard and hence a minimum element.

A natural question to ask is how the system borne out in Japanese compares to other languages. As is well known, many languages, such as Spanish, Korean, Russian, disallow absolute measure phrases, and unlike Japanese, they result in strict ungrammaticality rather than a forced comparative interpretation:

- (73) \* Pedro es un metro alto. SPANISH  
 Pedro is onemeter tall  
 (74) \* i kenmwul-un sip mite **khu**-ta. KOREAN  
 this building-TOP ten meter tall-DECL

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(i)  $[[\text{takai } c]]^g = \lambda x. \max(\lambda d. x \text{ is } d\text{-tall}) > g(c)$

However, this approach seems not to explain the difference between *This shelf is tall* and *This shelf is taller*.

- (75) \* On dva metra **vysokij**. RUSSIAN  
 he two meters tall (Matushansky 2002:241)

In a comparative construction, on the other hand, measure phrases are perfectly grammatical in these languages:

- (76) Pedro es un metro **más alto** que Jorge. SPANISH  
 Pedro is one meter more tall than Jorge  
 'Pedro is one meter taller than Jorge.'
- (77) i kenmwul-un sip mit **te khu**-ta. KOREAN  
 this building-TOP ten meter more tall-DECL  
 'This building is ten meters taller.'
- (78) On na metr **vyshe** Billa. RUSSIAN  
 he by meter high.MORE Bill.GEN  
 'He is one meter taller than Bill.'

It is on the basis of this kind of data that Schwarzschild proposed his generalization that all languages that allow absolute measure phrases allow differential measure phrases but not vice versa. Strikingly, however, all three of these languages pattern like Japanese in that adjectives with a lower-closed scale allow absolute measure phrases:

- (79) Esta varilla está **doblada** noventa grados. SPANISH  
 This rod is bent ninety degrees  
 'This rod is ninety degrees bent.'
- (80) i hwoychori-nun i-to (cengto) **hwies**-ta. KOREAN  
 this rod-TOP two-degree about bent-DECL  
 'This rod is (about) two degrees bent.'
- (81) Etot prut **pognut** na p'at' gradusov. RUSSIAN  
 this rod bent by five degrees  
 'This rod is five degrees bent.'

What this suggests is that our proposal regarding the semantic selectional restriction on *Meas* in Japanese is in fact universal: all of the languages that we know of allow absolute measure phrases with predicates that have a minimum element, whether the minimum element is the consequence of an inherently lower-closed scale, or the consequence of a standard of comparison. Thus we hypothesize that the following denotation for *Meas* which we proposed for Japanese is universal:



(82)  $[[Meas]] = \lambda g_{\langle e, d \rangle}$ :  $g$  is a function from objects to measurable degrees and  $g$   
**has a minimum element**  $\lambda d \lambda x. g(x) \geq d$

This proposal subsumes Schwarzschild's generalization but additionally predicts that lower-closed-scale adjectives should pattern with comparatives in allowing measure phrases.

As for the observed crosslinguistic variation, we speculate that it is the consequence of two interdependent parameters:

- (83)
1. A language {does, does not} allow measure phrases with a lexically idiosyncratic set of open-scale adjectives. (English, Italian, Dutch, German, French do; Japanese, Spanish, Korean, Russian do not.)
  2. Among languages that do **not** allow measure phrases with a lexically idiosyncratic set of open-scale adjectives: a language {does, does not} have a covert mechanism for coercing a comparative interpretation to grammatically allow a measure phrase to combine with an open-scale adjective. (Japanese does; Spanish, Korean, Russian do not.)

As for the first parameter of variation, we do not know of any independent grammatical properties that correlate with the settings. The split seems to cut across languages that are typologically quite heterogeneous. We hypothesize that in languages that allow measure phrases with certain open-scale adjectives, what happens is that *Meas* specifies a set of adjectives that it can combine with (cf. Svenonius and Kennedy 2006) which can override the general semantic restriction that is normally operative.

It may be possible to consider that in these languages there is another type of coercion, which coerces open-scale adjectives into having a lower closed scale. However, we must admit that that this kind of coercion is not productive. For example, in English the scale of the adjective *tall* can be coerced into a lower-closed scale but the scale of *heavy* cannot be coerced into a lower-closed scale (e.g. \* 5 pounds heavy). (Note that German *schwer* 'heavy' is compatible with a measure phrase (Schwarzschild 2005). Thus, there is a mode-internal variation among languages).

As for the second parameter, we speculate that there is a principled reason for the split between Japanese on the one hand and Spanish, Korean and Russian on the other hand. Recall that in our analysis of Japanese, comparative semantics is provided by *yoru* in sentences where there is an overt standard of comparison:

- (84) Kono tana-wa ano tana-**yorì** (2-meetoru) takai.  
 This shelf-TOP that shelf-than 2-meter tall  
 ‘This shelf is (2 meters) taller than that shelf.’

In the absence of an overt standard of comparison, *yorì*, as an adposition, is syntactically disallowed, and so when a measure phrase is present, a covert comparative operator arises through coercion:

- (85) Kono tana-wa 2-meetoru **Op** takai.  
 This shelf-TOP2-meter tall  
 ‘This shelf is (2 meters) taller.’

We suggest that the crucial difference in Spanish, Korean and Russian is that comparative semantics is provided not by the standard marker but rather by morphology that attaches to the gradable adjective (*más* in Spanish, *te* in Korean, and inflectional morphology on the adjective itself in Russian):<sup>15</sup>

- (86) Pedro es un metro **más** alto que Jorge. SPANISH  
 Pedro is one meter more tall than Jorge  
 ‘Pedro is one meter taller than Jorge.’
- (87) i kenmwul-un sip mit **te** khu-ta. KOREAN  
 this building-TOP ten meter more tall-DECL  
 ‘This building is ten meters taller.’
- (88) On na metr **vyshe** Billa RUSSIAN  
 he by meter high.MORE Bill.GEN  
 ‘He is one meter taller than Bill.’

We suggest that the comparative morphology in these languages **blocks** the use of covert coercion operator posited for Japanese. The principle at work here can be thought of as a version of Chierchia’s (1998) Blocking Principle, whose original text is provided here:

- (89) *Blocking Principle* (‘Type Shifting as Last Resort’)  
 For any type shifting operation  $\tau$  and any X:

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<sup>15</sup> Note that this proposal commits us to the view that in languages that have overt comparative morphology (Spanish, Korean, Russian), the semantics of comparison is located on the comparative morphology, whereas in languages that lack overt comparative morphology (Japanese), the semantics of comparison is located on the standard morphology.

\* $\tau(X)$  if there is a determiner  $D$  such that for any set  $X$  in its domain,  
 $D(X) = \tau(X)$

(Chierchia 1998:360)

Although Chierchia's Blocking Principle is specific to competition between covert type shifters and overt determiners, what we suggest is that it can be generalized to competition between any covert coercion operator (whether it type shifts or shifts in some other way, as in de Swart's aspect shift or our scale shift) and any functional morpheme (whether a determiner, or, as in our case, a comparative morpheme), as long as the competition is between items that have the same syntactic distribution.

Our modified version of Chierchia's Blocking Principle is as follows:

(90) *Blocking Principle* ('Coercion as Last Resort')

For any coercion operator  $Op$  and any  $X$ :

\* $Op(X)$

if there is a functional morpheme  $F$  such that for any argument  $X$  in its domain,  $F(X) = Op(X)$

**and  $F$  has the same syntactic distribution as  $Op$ .**

Thus in Spanish, Korean, Russian, the syntactic availability of overt comparative morphology blocks the introduction of a covert operator. In Japanese, on the other hand, because comparative semantics is provided by *yoru* which syntactically requires an overt standard,  $Op$  is not blocked and hence coercion results.

## 8 Conclusions

In this paper we investigated the syntax and semantics of measure phrases in Japanese and proposed an analysis that addresses cross-linguistic variation in the interpretation of measure phrases. We argued that the interpretation of measure phrases in Japanese is sensitive to scale structure such that (i) the functional head *Meas* that introduces measure phrases selects only for gradable predicates that have a minimum element and (ii) violations to this restriction are repaired via coercion, which forces a comparative interpretation with a contextually determined standard and hence a minimum element.

We extended our analysis of the interpretation of Japanese measure phrases and argued that the requirement of having a minimum element in order to compute measurement is not specific to Japanese but rather it is universal. We showed that languages may vary in how they deal with potential violations of

the universal semantic constraint, including coercion of a contextually recoverable derived minimum element (e.g. Japanese), ungrammaticality (e.g. Spanish, Korean, Russian) and a hybrid system of ungrammaticality for some adjectives and allowed constraint violation for others (e.g. English, German, Italian, Mandarin).

A major theoretical implication of this proposal is that the interpretation of measure phrases is sensitive to scale structure. Scalar sensitivity in the interpretations of measure phrases is another piece of supporting evidence for positing scale structure (i.e., open vs. closed) as a linguistically significant parameter in the lexical semantics of adjectives (Kennedy and McNally 2005).

Furthermore, our analysis sheds new light on the typology of measure phrase interpretation. We showed that Schwarzschild's cross-linguistic generalization—that every language that allow absolute measurement (measure phrase with a positive form adjective) also allows differential measurement (measure phrase with a comparative form) but not vice versa — can be subsumed under a broader semantic generalization. Namely, if a language allows measurement in the absence of a minimum element, then it allows measurement from a minimum element, but not vice versa. The apparent opposition between comparative and non-comparative adjectives with respect to measure phrase acceptability is actually an opposition between predicates that have a minimum element and predicates that do not have a minimum element.

This paper leaves many things to be explored. First, a broader typological survey need to be conducted in order to test our theory. We have not yet encountered languages which behave similarly to Japanese in terms of the interpretations of measure phrases but our theory predicts that (a) if a language does not use comparative morphology for differential measurement and (b) if it does not allow measure phrases with a lexically idiosyncratic set of open-scale adjectives, it should be like Japanese.

Second, there is a question as to whether there are languages that allow absolute measurement in a fully productive way. We observed that languages like English, German and Italian allow measure phrases with a lexically idiosyncratic set of open-scale adjectives. However, we have not seen a language which allows measure phrases to combine with any kinds of open-scale measurable adjectives. If such a language exists, then it will support the idea that there is another kind of coercion, which turns an open scale into a lower closed scale. Further typological surveys need to be done.

Finally, there is a question as to why there is a tendency that predicates that give rise to absolute measurement tend to be deverbal (i.e., verb-*teiru*), whereas the predicates that give rise to differential measurement tends to be adjectival. As far as we know, the verb-*teiru* form never occurs in differential measurement.

Thus it is likely that there is a correlation between scale structure (i.e., open vs. lower closed) and morphology (i.e., adjectival vs. deverbal).

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### **References**

- Bartsch, Renate, and Theo Vennemann, T. 1973. *Semantic Structures: A Study in the Relation between Syntax and Semantics*. Frankfurt: Athäenum Verlag.
- Beck, Sigrid, Toshiko Oda and Koji Sugisaki. 2004. Parametric Variation in the Semantics of Comparison: Japanese vs. English. *Journal of East Asian Linguistics* 13:289-344.
- Beck, Sigrid. 2008. Comparison Constructions. To appear in Maienborn, Claudia, Klaus von Heusinger & Paul Portner: *Handbook of Semantics*.
- Bolinger, Dwight. 1972. *Degree Words*. Paris: Mouton
- Chierchia, Gennaro. 1998. Reference to Kinds across languages. *Natural Language Semantics* 6: 339-405.
- Corver, Norbert. 1997. Much-support as a Last Resort. *Linguistic Inquiry* 28:119-164.
- de Swart, Henriëtte. 1998. Aspect shift and coercion. *Natural Language and Linguistic Theory* 16: 347-385.
- Ernst, T.B. 1984. *Towards an integrated theory of adverb position in English*. Bloomington: Indiana University.
- Fujii, Tadashi. 1966. Dooshi+te iru no Imi (The meaning of V-te iru), *Kokugo Kenkyuushitsu* 5, Tokyo University, Tokyo (reprinted in Kindaichi (1976)).
- Fukui, Naoki. 1986. *A Theory of Category Projection and its Applications*. Ph.D. Diss., MIT.
- Grano, Thomas and Christopher Kennedy. 2009. Mandarin transitive comparatives and the syntax of measurement. Ms. University of Chicago.
- Hayashishita, J.-R. 2009. Yori-comparative: A reply to Beck et al. (2004). *Journal of East Asian Linguistics* 18: 65-100.

- Jacobsen, W.M. 1992. *The Transitive Structure of Events in Japanese*. Tokyo: Kurocio Publishers.
- Kennedy, Christopher. 1999. *Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison*. New York: Garland. (1997 UCSC Ph.D. thesis)
- Kennedy, Christopher. 2001. Polar opposition and the ontology of 'degrees'. *Linguistics and Philosophy* 24:33-70.
- Kennedy, Christopher. 2007a. Vagueness and Grammar: The Semantics of Relative and Absolute Gradable Adjectives. *Linguistics and Philosophy* 30(1):1-45.
- Kennedy, Christopher. 2007b. Standards of Comparison. Handout of Colloque de Syntaxe et Sémantique à Paris.
- Kennedy, Christopher, and Beth Levin. 2008. Measure of Change: the Adjectival Core of Degree Achievements. In L. McNally and C. Kennedy, eds., *Adjective and Adverbs: Syntax, Semantics, and Discourse*, 156-183. Oxford: Oxford University Press.
- Kennedy, Christopher, and Louise McNally. 2005. Scale Structure and the Semantics Typology of Gradable Predicate. *Language* 81:345-381.
- Kikuchi, Akira. 2006. On the Interpretation of Measure Phrases in English and Japanese. In S, Haraguchi, O. Fujimura, and B. Palek, eds., *Proceedings of LP 2002*, 971-980, Charles University in Prague: The Karilinum Press.
- Kindaichi, Haruhiko. 1950. Kokugo Dooshi no Ichibunrui. *Gengo Kenkyuu* 15, 48-63 (reprinted in Kindaichi (1976)).
- Kindaichi, Haruhiko. 1976. Nihongo dooshi no tensu to asupekuto (Tense and aspect of Japanese verbs). In Kindaichi, Haruhiko (ed.), *Nihongo dooshi no asupekuto* (Aspect of Japanese verbs) Tokyo: Mugisyoboo.
- Klein, Henny. 1998. *Adverbs of Degree in Dutch and Related Languages*. Amsterdam/Philadelphia: John Benjamins Publishing Company.
- Kubota, Yusuke. 2009. Setting the Standard, Measuring Degrees: the Semantics of Yori 'than' Phrases and Measure Phrases in Japanese. Ms. The Ohio State University.
- Matushansky, Ora. 2002. Tipping the Scales: The Syntax of Scalarity in the Complement of *Seem*. *Syntax* 5(3):219-276.
- Nakanishi, Kimiko. 2007. *Formal Properties of Measurement Constructions*. Berlin: Mouton de Gruyter.
- Oda, Toshiko. 2005. Japanese Adjectives in Comparative Form. *Nihon Gengo Gakkai Dai 120 Kai Taikai Yokoosyuu (The Handbook of the 130<sup>th</sup> Meeting of the Linguistic Society of Japan)*:98-103.
- Oda, Toshiko. 2008. *Degree constructions in Japanese*. Doctoral Dissertation, University of Connecticut.

- Ogihara, Toshiyuki. 1998. The ambiguity of the *-te iru* form in Japanese. *Journal of East Asian Linguistics* 7: 87-120.
- Paradis, Carita. 2001. Adjectives and boundedness. *Cognitive linguistics* 12: 47-65.
- Pustejovsky, James. 1995. *The Generative Lexicon*. Cambridge: Cambridge University Press.
- Rotstein, Carmen, and Yoad Winter. 2004. Total adjectives vs. partial adjectives: Scale structure and higher-order modifiers. *Natural Language Semantics* 12:259-288.
- Sawada, Osamu. To appear. The Comparative Morpheme in Modern Japanese. *Proceedings of the 34<sup>th</sup> Annual Meeting of the Berkeley Linguistics Society*.
- Schwarzschild, Roger. 2005. Measure Phrases as Modifiers of Adjectives. *Recherches linguistiques de Vincennes* 34:207-228.
- Shirai, Yasuhiro. 2000. The semantics of the Japanese imperfective *-teiru*: an integrative approach. *Journal of Pragmatics* 32: 327-361.
- Snyder, William, Wexler, Kenneth and Das Dolon. 1995. The Syntactic Representation of Degree and Quantity: Perspectives from Japanese and Child English. In R. Aranovich, W. Byrne, S. Preuss, and M. Senturia, eds., *The Proceedings WCCFL 13*, 581-596. Stanford, CA: CSLI.
- Svenonius, Peter and Christopher Kennedy. 2006. Northern Norwegian Degree Questions and the Syntax of Measurement. In M. Frascarelli, ed., *Phrases of Interpretation*, 129-157. The Hague: Mouton de Gruyter.
- Teramura, Hideo. 1984. *Nihongo no Sintakusu to Imi II* (The syntax and semantics of Japanese). Tokyo: Kuroshio Publishers.
- Tsujimura, Natsuko. 2001. Degree words and scalar structure in Japanese. *Lingua* 111: 29-52.

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